diversity of types, including bits of forests of the southern beech, *Nothofagus Cliffortioides*, various scrub associations, and low tussock grassland, with transitions through reed and sedge swamp to open water. Of these the tussock grassland is by far the most important and interesting, representing as it does a montane association covering some 6,000,000 acres ranging from an altitude of 1000 to 3000 ft. It is dominated by the two smaller tussock grasses, *Poa caespitosa* and *Festuca nova-zealandiae*, in many places changed by burning and sheep grazing so as to permit the invasion of other grasses and herbs. The association not only presents many interesting ecological problems, but its proper utilization is a matter of great economic importance,[22] since one-seventh of the occupied land of New Zealand is covered with this vegetation. At present it is largely given over to sheep grazing, but without producing satisfactory returns.—GEO. D. FULLER.

Anatomy of Gnetum moluccense.—LA RIVIÈRE[23] has described the structure of a single branch of *Gnetum moluccense*. The greater part of the paper is devoted to a study of the accessory (secondary) steles outside of and concentric with the first stele. The remarkable conclusion is reached that they originate in the nodes from ramifications of bundles passing to the lateral branches and then grow *downward* (toward the base of the stem), the cambiums appearing at lower and lower levels in the inner cortex. The difficulties in this conception, that the direction of their growth is the reverse of the usual one, will present themselves to both morphologists and physiologists. Communications of the accessory steles with each other and with the central one, originally discovered by BERTRAND but overlooked by all later workers, are carefully traced and appear to be quite numerous. The different tissues of the whole stem are briefly described, but according to the author's observations present no features of outstanding morphological significance. This is perhaps the reason that no conclusions are mentioned in regard to the affinities of Gnetales with either gymnosperms or angiosperms.—W. P. THOMPSON.

Nitrogen determination.—Several years ago FOLIN modified the Kjeldahl method of determining nitrogen so that small quantities could be determined with sufficient accuracy. DAVIS,[24] who has used this modified method extensively for determination of nitrogen in small quantities of plant materials, reports that it is specially good for demonstrating proteolytic changes, for determination of nitrogen in minute plant sections or organs, and the effects of various factors upon the nitrogen content of plant tissues. The method is

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[22] COCKAYNE, A. H., Some economic considerations concerning montane tussock grassland. *Ibid*. **48**:154–165. 1916.

[23] LA RIVIÈRE, HENRIETTE C. C., Sur l'anatomie et l'epaississement des tiges du *Gnetum moluccense* Karst. Ann. Jard. Bot. Buitenzorg **30**:32–58. *pls. 4–12*. 1916.

[24] DAVIS, A. R., A note on the adaptability of the Folin micro-Kjeldahl apparatus for plant work. Ann. Mo. Bot. Gard. **2**:407–412. 1916.

best suited to amounts of nitrogen running from 0.5 to 5 mg., and the substance taken for determination should correspond to such quantities of nitrogen. The apparatus consists of small Kjeldahl flasks, fume absorbers, micro-burners, Ostwald pipettes, and small condensers, all readily obtainable or easily constructed. Titration is used, rather than the colorimeter method, for the actual determination. A comparison of the determinations with the micro- and macro-Kjeldahl method shows that the micro method can be relied upon as reasonably accurate. The method will be exceedingly valuable with advanced classes in physiology.—CHARLES A. SHULL.

Carbon nutrition.—The ability of *Glomerella cingulata* to utilize certain pentosans and pentoses as a source of carbon has been investigated by HAWKINS.[25] He finds that arabin and xylan, and the derived sugars, arabinose and xylose, may be used as the sole source of carbon. When this fungus causes rot in apples, it decreases the total furfurol-yielding content of the apple, but the alcohol-soluble portion of the furfurol-yielding material is increased. This change indicates that the pentose sugars are split off from the more complex pentosans of the apple. The enzyme producing this change was sought. Filtered extract of the mycelium, acting under aseptic conditions, is able to change xylan to xylose, but it loses its power when boiled. It is clear, therefore, that a xylanase is present in the fungus or its extract which can hydrolyze xylan.—CHARLES A. SHULL.

Plant formations of Canada.—In a brief bulletin of less than a score of pages MACOUN and MALTE[26] have outlined some of the most strikingly characteristic plant formations of Canada and noted their distribution and dominant species. It will serve to give some idea of the flora as a whole, and will indicate the wide diversity to be found, extending as it does from rich mesophytic forests of conifers and deciduous trees to xerophytic grassland and Arctic tundras.—GEO. D. FULLER.

Californian plants.—An addition to our knowledge of the vegetation of a portion of the Sierra Nevada Mountains comes in the form of an annotated list of species by PARISH[27]. The region includes associations of chaparral and conifer forests; among the latter *Pinus monophylla*, *P. ponderosa*, and *P. Murrayana* dominate at different altitudes.—GEO. D. FULLER.

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[25] HAWKINS, L. A., The utilization of certain pentoses and compounds of pentoses by *Glomerella cingulata*. Amer. Jour. Bot. **2**:375–388. 1915.

[26] MACOUN, J. M., and MALTE, M. O., The flora of Canada. Can. Geol. Survey. Museum Bull. **26**:14. 1917.

[27] PARISH, S. B., An enumeration of the Pteridophytes and Spermatophytes of the San Bernardino Mountains, California. Plant World **20**:163–178, 208–223, 245–259. 1917.